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wherein said flexible instrument is configured to sense a controlled magnetic field.

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3. The flexible instrument of claim 1 wherein said controlled magnetic field is a three-dimensional magnetic field generated using a plurality of controlled magnetic coils.

4.

The flexible instrument of claim 1 wherein said at least one distal sensor comprises a magnetic tip sensor for sensing said controlled magnetic field.

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14.

A flexible instrument, comprising:

a flexible member having <sup>a proximal portion,</sup> an intermediate portion and a distal tip;  
at least one fiber-optic intermediate sensor disposed at a predetermined

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point along said intermediate portion of said member for providing an intermediate path signal indicative of the path of said intermediate portion of said flexible member;

at least one distal sensor positioned proximate said distal tip of said flexible member for providing a distal tip position signal which is independent of the intermediate path signal and indicative of the position of said distal tip of said flexible member; and

a processor responsive to said intermediate path signal and said distal tip position signal for providing an indication, in a common reference frame, of the position and angular orientation of said distal tip and said intermediate portion of said flexible instrument;

wherein said flexible instrument is configured to sense a controlled magnetic field.

In the abstract:

A flexible instrument, which is configured to sense a controlled magnetic field, includes a flexible member having an intermediate portion and a distal tip. At least one fiber-optic intermediate sensor disposed at a predetermined point along the intermediate

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portion of the member provides an intermediate path signal indicative of the path of the intermediate portion of the flexible member. At least one distal sensor positioned proximate the distal tip of the flexible member provides a distal tip position signal which is independent of the intermediate path signal and indicative of the position of the distal tip of the flexible member.

